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AUTHOR Armbruster, Bonnie B.; Anderson, Thomas H.
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ABSTRACT

Theory and research in reading comprehension have confirmed the important role of text structure in learning from written materials. The previous work with story grammars provided the basis of this attempt to define frames for explanations in history that would be likely to aid learning. A suggested goal frame includes the goals, plan, action, and outcome that are assumed to constitute the "main ideas" associated with the explanation of a historical event. The goal frame can be used for most interpretations or philosophies of history, since historical events must ultimately be explained in psychological terms, with human beings as the agents of change. The goal is the desired state sought by the main character, the plan is the cognitive strategy for attaining the goal, the action is overt behavior in response to the plan, and the outcome is the consequence of the action, which may either satisfy or fail to satisfy the goal. A variation of the goal frame gives rise to a new frame, the problem/solution frame. The problem is an event, a condition, or a series of events or conditions resulting in a state that is an obstacle to the attainment of the goal. The problem prompts a solution that takes the form of the plan, action, and outcome of the goal frame. The outcome of the solution either solves or fails to solve the problem. Suggestions are made for using the frames as tools in evaluating historical explanations in textbooks, writing historical explanations, and teaching historical explanations. (HOD)

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CENTER FOR THE STUDY OF READING

Technical Report No. 252

STRUCTURES FOR EXPLANATIONS IN HISTORY TEXTBOOKS OR SO WHAT IF GOVERNOR STANFORD MISSED THE SPIKE AND HIT THE RAIL?

Bonnie B. Armbruster
Thomas H. Anderson
University of Illinois at Urbana-Champaign

July 1982

University of Illinois
at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02238

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Abstract

Theory and research in reading comprehension have confirmed the important role of text structure in learning from written materials. Text structures that are commonly found in informative, textbook-like prose are just beginning to be identified. In the absence of prior work on structures for history texts, this report proposes generic structures, or frames, that can accommodate explanations of many historical events. Suggestions are made for using the frames as tools in evaluating historical explanations in textbooks, writing historical explanations, and teaching historical explanations.

Structures for Explanations in History Textbooks

The authors' goal in a continuing program of research is to identify some of the important features of informative, content area text that influence how well the text is learned and remembered. We are particularly interested in the practical applications of knowledge about important text features: How publishers and authors could improve the quality of informative text and how teachers could help students both learn from content area texts and learn how to learn from content area reading.

In earlier papers (Anderson, Armbruster, & Kantor, 1980; Armbruster & Anderson, 1981; Armbruster, in press), we discussed text variables which appear to influence learning from informative text. One of the most important of these characteristics of text is structure, or organization. In this report we will first briefly review the rationale for the importance of text structure in comprehension and learning. The major purpose of the report, however, is to propose some generic text structures applicable to history text. We also suggest how these generic structures might be used in evaluating history texts, in writing history texts, and in teaching history.

A Rationale for the Importance of Text Structure

A little background in reading theory is prerequisite to an understanding of the role of structure in learning. A widely accepted theory of reading is schema theory. According to schema theory, a reader's schema, or organized knowledge of the world, provides much of the basis for comprehending, learning, and remembering information in text. Comprehension occurs when the reader activates or constructs a schema that

explains events and objects described in the text. As they first begin to read, readers search their memories for a schema to account for the information, and, on the basis of the schema, construct a partial model of the meaning of the text. The model then provides a framework for continuing the search through the text. The model is progressively refined and constrained as readers gather more information. Reading comprehension thus involves the progressive focusing and refinement of a complete, plausible, and coherent model of the meaning of the text.

Schema theory underscores the importance of the reader's existing knowledge in reading comprehension. Indeed, dozens of experiments have verified the role of background knowledge in understanding and recalling information from text. What the reader brings to the text, however, is not the only factor that affects learning. Characteristics of the text itself also affect learning outcomes by influencing the reader's ability to construct a coherent model of the text's meaning.

One of the most important of the characteristics of text that influences learning outcomes is structure (see, for example, Armbruster, in press; Meyer, 1979; Shimmerlik, 1978). The explanation for the importance of text structure in terms of schema theory is the following: The better structured the text and the more apparent the structure to the reader, the more likely the reader is to be able to construct a coherent model of the text's meaning, i.e., to comprehend the text. Knowing that structure is important in learning from text is not very useful, however, unless one can define this construct more precisely.

Our particular interest is in defining structures for informative text in the content areas. Our belief is that much of the content of the

disciplines, or subject matter areas, can be formulated in a relatively small number of generic structures or generalized plots, each with its own set of content categories or types of information. These structures reflect typical patterns of thought or ways of conceptualizing the content of the subject matter area. We refer to these generic structures of informative text as frames, and the content categories as slots.

Other researchers have proposed frames, primarily for the natural sciences. For example, Dansereau (1980) describes generic cognitive structures, which he calls knowledge schemata. Knowledge schemata consist of the set of categories of information a well-informed learner should know about a particular topic. An example is a knowledge schema related to scientific theories, derived by asking a sample of college students what they considered to be the important categories of information relevant to understanding a scientific theory. The major resulting categories were Description, Inventor/History, Consequences, Evidence, Other Theories, and Extra Information, each having its own subcategories. Although knowledge schemata are meant to describe cognitive rather than text structures, it is easy to imagine text structured in a similar way. Working with texts, Lunzer, Davies, and Greene (1980) have proposed several frames for secondary science texts. For example, Lunzer et al. (1980) propose frames for Structure, Mechanism, Process, and Hypothesis-Theory, each with its own set of slots. The Process frame, for instance, describes or explains transformations or sequential changes over a period of time. The Process frame has slots for the State or Form of the phenomena at different stages; the Properties/Structure of the phenomena, the Stage or Steps or Time of change, the Instrument or Agent of change,

the Action which causes transformation, the Location of the change, and the Transformation.

To date, we have seen no attempts to define frames for the social sciences. The purpose of this report is to begin to fill this gap by proposing some frames appropriate for explanations in history texts. The next section describes the theoretical and empirical bases for our particular choice of history frames.

Theoretical and Empirical Basis for the Frames

"History is viewed broadly as a body of information and a process through which we attempt to understand the human experience" (Drewry, O'Connor, & Freidel, 1982). What does it mean to "attempt to understand the human experience?" According to philosopher of science Ernst Nagel (1961), the study of history entails the study of "the motives and other psychological matters that constitute the springs of purposive human behavior as well as with the aims and values whose attainment is the explicit or implicit goal of such behavior" (p. 474). Thus, a broad view of history is that it is an attempt to understand the human experience through psychology. That is, historical events are assumed to be explainable in terms of goals and actions taken to attain those goals. Therefore, we think that a frame for history would need to be based on this psychological foundation.

A psychology-based frame already exists in the form of the "story grammars" proposed by cognitive psychologists (e.g., Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1978; Thorndyke, 1977). Story grammars define what constitutes a well-formed or coherent narrative.

While story grammars differ in detail, they all contain the same fundamental elements: an account of the character's actions in terms of the character's goals and the subgoals needed to satisfy those goals. Therefore, story grammars appear to contain the same basic elements that historical explanations should contain.

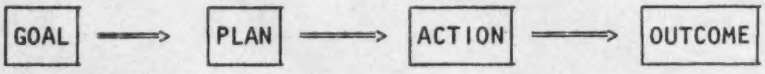
From research using story grammars, we know some of the characteristics of narratives that influence the reader's ability to understand and remember the narrative. First, memory for narratives is superior when the content is organized according to the stereotypical story grammar (e.g., Mandler & Johnson, 1977; Kintsch, Mandel, & Kozminsky, 1977; Mandler, 1978; Stein, 1976; Thorndyke, 1977). Altering the structure by displacing or deleting story elements results in poorer memory for the stories and lower ratings of story comprehensibility (Thorndyke, 1977). Second, information about the goal and the events leading up to the goal is critical to narrative comprehension and/or recall (Abbott & Black, Note 1; Kintsch & Van Dijk, 1978; Rumelhart, 1977; Thorndyke, 1977). For example, Thorndyke (1977) concluded from his research that both rated comprehensibility and recall of stories were a function of the amount of identifiable plot structure, where plot structure is defined as "those elements of a story which render the sequence of actions coherent and purposeful: The theme or goal, the stated or implied intent and motivation of actions performed by the characters, and some final resolution of the initial problem of the story" (Thorndyke, 1977, p. 83). In the study by Abbott and Black (Note 1), information about the character's goals, the source of those goals, and the plans to attain those goals formed an organizational unit in the representation of the text in memory. The

authors concluded that "people are using units based on the intentions of characters to organize texts" (p. 3).

In sum, story grammars define a structure that fulfills the requirements for an explanation of an historical event. Research using story grammars reveals characteristics of narrative text that are critical to learning. Thus, previous work with story grammars provided the basis for our attempt to define frames for explanations in history that would be likely to aid learning. We turn now to a description of our frames for historical explanation.

Frames for History

While story grammars appeared to provide a good foundation for frames in history, story grammars are more complex than we thought we needed for our practical purposes. Therefore, we formulated the following abbreviated version of a story grammar for our basic history frame, which we call the "Goal frame." The goal frame is depicted in the following diagrammatic representation, which we call a "frame map."



The Goal, Plan, Action, and Outcome are the slots of the frame, and are assumed to constitute the "main ideas" associated with the explanation of an historical event. The Goal is the desired state sought by the main character, which we are defining as either an individual or a group of people acting or assumed to act as a single entity. The Plan is the cognitive strategy for attaining the Goal. While Plans are often difficult

to distinguish from subgoals, a Plan directly precipitates the Action. The Action is overt behavior in response to the Plan. The Outcome is the consequence of the Action, which may either satisfy or fail to satisfy the Goal.

We assume that an explanation of an historical event consists of a response to questions associated with each of the frame slots. For the Goal frame, the text will answer for the reader the following "frame slot questions": 1. What was the Goal? 2. What was the Plan for attaining the Goal? 3. What Action was taken in response to the Plan? 4. What was the Outcome (or Outcomes) of the Action with respect to the Goal?

The following brief excerpt from a history text is one instantiation of the Goal frame.

> [1]During the 1600's, several English colonies were founded along the east coast of North America. [2]The first permanent settlement was Jamestown, established in 1607 in what is now Virginia. [3]The second, Plymouth, was set up in 1620 in what is now Massachusetts.
>
> [4]These settlements were primarily commercial ventures, undertaken in the hope that the settlers might raise the products England had to import from the East and thus make the mother country more self-sufficient. [5]Commercially the North American colonies were disappointing; few of the original investors got their money back, to say nothing of making profits. Mazour & Peoples, 1968, pp. 325-326)

The "character" here is England, or more properly, the English people. We think the Goal is stated in Sentence 4: to become more self-sufficient. An implicit superordinate Goal for at least a subset of Englishmen is inferrable from the last sentence: "to make a profit." Sentence 4 also

contains the Plan, signalled as a cognitive strategy by the phrase "in the hope that." The Plan was: to have settlers (in North America) raise the products England had to import from the East. One could argue that this is a subgoal; we call it a Plan because it bears a direct relationship to the Action taken. The Action is stated in Sentence 1: several English colonies were founded along the east coast of North America. Sentences 2 and 3 are elaborations (examples) of the Action. The Outcome is found in Sentence 5: the superordinate Goal, at least, was not satisfied, although the text is vague about whether the English people as a whole became more self-sufficient.

Obviously, the Goal frame is very general. It is intentionally so, since we wanted a frame that could be applied to a wide variety of history texts. In fact, we think that the Goal frame can be used for most interpretations or philosophies of history, since historical events must ultimately be explained in psychological terms, with human beings as the agents of change.

The slots of a Goal frame can be instantiated, by author and reader, at any desired level of detail. For example, consider the Goal slot. We believe that there are a finite and relatively small number of basic goals at the top of the hierarchy. These goals are identified within the various traditional disciplines and can best be identified by content-area experts. Here are some likely candidates for basic goals:

from biology: obtaining food, water, shelter

from economics: distributing available resources, making a profit

from political science: getting and keeping power, maintaining order

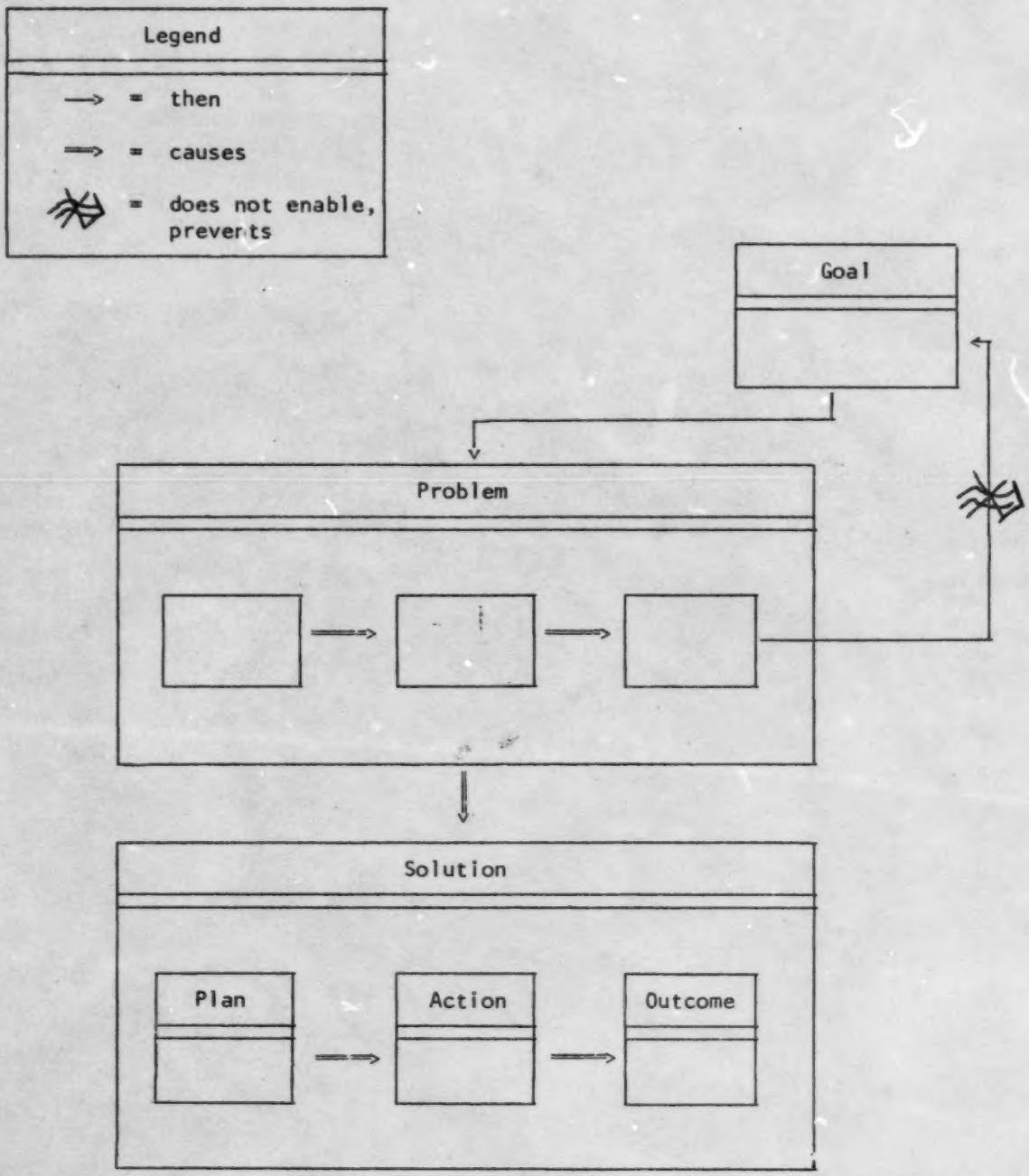
At lower levels of the hierarchy are subgoals which must be fulfilled in order to satisfy the basic goals. Note that the textbook example contained two levels or types of goals: to make a profit and to become more self-sufficient.

The Plan slot can likewise be instantiated at any level of detail. The author may not choose to express the Plan at all, since it is usually easily inferrable from the Action. Or, the author might include a rather lengthy discussion of why the particular Plan was selected. For example, the author might compare and contrast actual outcomes of previous implementations of the same Plan with desired outcomes of the current Plan. Or, the author could compare and contrast anticipated outcomes of the current Plan with anticipated outcomes of alternate Plans.

Next, consider the Action and Outcome slots. The Action can be stated as a unitary event or broken down into its constituent sequence of steps. A detailed Action can thus include embedded Goal frames, since the character has to engage in goal-directed behavior to accomplish each step in the sequence. Finally, the Outcome slot can be expanded to include consequences of the Action unrelated to the goal-seeking behavior of the character. Such unintended or unanticipated "Other Outcomes" of Actions are very common in history. One Outcome could also be the initiation of another goal-directed behavioral sequence.

In addition to instantiating the frame at any desired level of detail, other variations of the Goal frame are possible. One variation gives rise to a new frame, which we call the Problem/Solution frame.

The Problem is an event, a condition, or a series of events or conditions resulting in a state that is an obstacle to the attainment of


Legend
= then
= causes
= does not enable, prevents
Goal
Problem
Solution
Plan
Action
Outcome

the Goal. The Problem prompts a Solution, which takes the form of the Plan, Action, and Outcome of the Goal frame. The Outcome of the Solution either solves or fails to solve the Problem; that is, the Outcome either satisfies or fails to satisfy the Goal.

The frame slot questions associated with the Problem/Solution frame are:

1. What was the Goal?
2. What was the Problem? That is, why did the character have trouble attaining the Goal?
3. What was the Plan for solving the Problem?
4. What Action was taken in response to the Plan?
5. What was the Outcome of the Action with respect to the Goal?

As an example of text for which this frame is appropriate, consider typical accounts of the "voyages of discovery." Such accounts usually begin with a statement of the Goal--the desire of Europeans for goods from the East, including silks and spices. The accounts go on to explain the problems of obtaining goods from the East. Here is the version from one textbook:

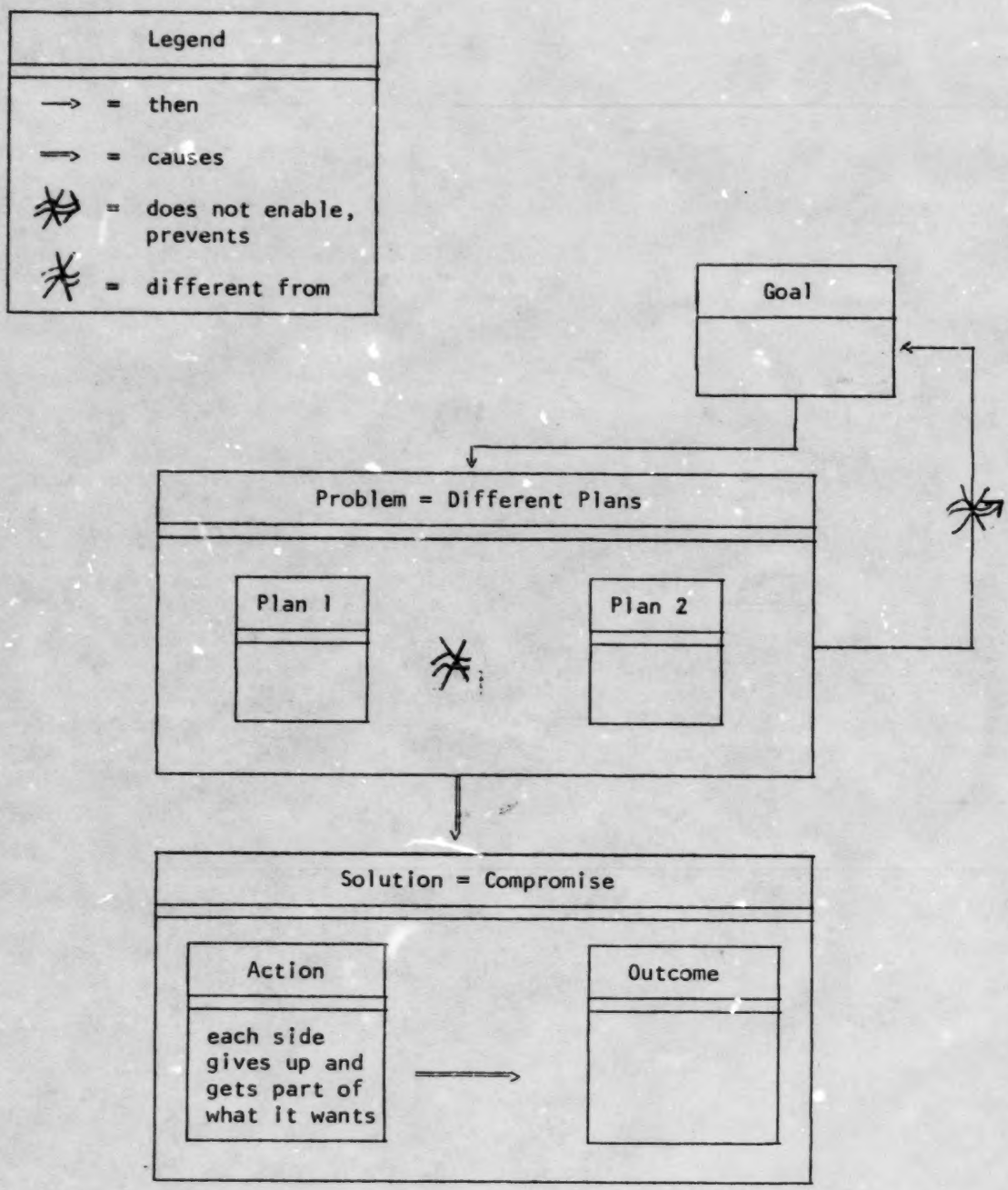
> The trade routes then in use presented several difficulties. Goods from the Far East (the part of Asia farthest from Europe) were transported the first part of the way by ship. Then they had to be unloaded and repacked on the backs of camels and donkeys for the overland trip to the Mediterranean Sea. There they were again reloaded by Italian merchants, who brought them to other parts of Europe. Each part of the journey was difficult and dangerous. The total amount of goods delivered each year was small. Because of the great risks and the costs of unloading and reloading, prices were very high. (Schwartz & O'Connor, 1971)

The accounts of the voyages of discovery tell that the rulers of the European nations decided to try to find an all-water route to the Far East--the Plan slot of the Solution. The Action slot consists of the actual voyages by various explorers. The Outcome slot includes the early disappointing outcomes of the quest for an all-water route as well as the resulting discoveries of the explorers.

The Goal and Problem/Solution frames described so far are appropriate for explaining events perpetrated by a single character or an aggregate of people acting as a single entity. The frames can be modified to accommodate the more typical case involving interactions among two or more characters (or aggregates), each attempting to achieve his/her own goals. For example, a common Problem is that the Goals and/or Plans of two parties are different or incompatible. Two common Solutions to this type of Problem are compromise and war. The Compromise frame takes the form shown on the following page.

Both parties start with the same basic Goal. The Problem is that the parties' Plans for achieving the Goal are different and apparently incompatible. The Solution is standard--a compromise. The Action slot is also standard--each side gives up and gets something of what it wants. The Outcome includes the specific result of the compromise--what each party obtained with respect to their original Plans and the underlying Goal.

For example, consider "The Great Compromise" involved in the framing of the U.S. Constitution. The common Goal of the Founding Fathers was to determine how the states were to be represented in the new Congress. Two different Plans were proposed for representation. The "New Jersey Plan" proposed a system of equal representation for all states. The "Virginia


Legend
= then
= causes
= does not enable, prevents
= different from
Goal
Problem = Different Plans
Plan 1
Plan 2
Solution = Compromise
Action
each side gives up and gets part of what it wants
Outcome

Plan" proposed that the number of representatives from each state should depend on its population. The "Great Compromise" combined the main features of both plans. The Outcome was a Congress having two houses; in the Senate, the representation from each state would be the same, while in the House of Representatives, representation would be based on population.

We believe that the interaction intrinsic to wars can also be captured in a variation of the Problem/Solution frame. While we speculate that the Problem is one of differences in Goals while the Solution consists of separate chains of Plans-Actions-Outcomes for the various warring factions, we have not studied the matter sufficiently to propose a "War frame" in this report.

In the next section, we discuss how the Goal and Problem/Solution frames might be used in evaluating textbooks, writing textbooks, and teaching and learning from textbooks.

Evaluating Historical Explanations Using Frames

The best way to evaluate students' ability to learn from textbooks, of course, is to try the textbook out on a sample from the intended audience of readers. Let us assume, however, that this option is not available for some reason, for example, because a textbook adoption committee does not have the time for proper student tryouts of every textbook under consideration.

Real audience tryouts aside, then, one way of evaluating text-based historical explanations is to measure the "fit" between the content of the text and the frame slots. In this way, the evaluator can determine whether the text contains content for all of the slots, whether it contains

content that does not fit any of the slots, and the relative weighting or emphasis given to the content in the various slots. This information can help authors evaluate the adequacy of explanatory text; if the explanation seems deficient, the frame analysis can suggest where and how the text should be revised. Likewise, the information can help teachers evaluate the adequacy of textbook explanations; if the explanation seems deficient, the teacher will know where to tell students to focus their attention, where to supplement the explanation, and/or how to question students to ensure that they understand the explanation.

This section has two objectives: to illustrate the use of the Problem/Solution frame as an evaluative tool, using excerpts from three fifth grade social studies textbooks, and to make a point about the content of these social studies texts.

A simple, straightforward approach to evaluating historical text is to see whether and how well the text answers the frame slot questions. We recommend at least a two stage assessment. On the first pass through the text, the evaluator notes whether the text answers the frame slot questions.

If the text fails to answer many of the questions, the evaluator may decide that the text is not a good explanation and may choose to terminate the evaluation. If the evaluation is to continue, the evaluator then assesses subjectively how well he/she thinks the questions are answered. In making this judgment of quality, the evaluator might consider the following kinds of questions:

1. How appropriate are the responses for the target audience of this textbook? Do they presume knowledge the readers are not likely to have? Are they complete enough answers for these readers?

2. How coherent are the responses? Do the ideas flow easily and clearly from one to another? Are important connectives, especially causal and temporal relationships, explicit? Are the questions answered in order in the text, or does the reader have to search all over the text to find the answer?

3. How unified are the responses? Is the text well balanced, with about the right amount of emphasis given to the responses to the various questions? Does the text contain information that is not very relevant to the response to any of the questions?

The following three textbook excerpts have been evaluated using this procedure. Although in the first two cases we probably would have chosen to terminate the evaluation after the first pass because so few of the questions were answered, we do offer some comments about the quality and characteristics of the text.

Excerpt No. 1

> May 1869. A golden spike, or large nail, shines in the sun. A colorful crowd gathers around it. Work crews, cooks, dishwashers, soldiers, engineers, railroad officials, and government leaders all push forward to get a closer look. The governor of California raises his hammer and gives a few mighty swings. He hammers the golden spike into the ground. It is the last nail in the first railroad to link California with the eastern U.S.
>
> This scene took place at Promontory Point, Utah. It marked the end of a great railroad-building race that had begun three years before. At that time, two railroad companies began

laying track. The Central Pacific Railroad started in Sacramento, California, and worked eastward. The Union Pacific started in Omaha, Nebraska, and worked westward. Both companies built track as fast as they could. They wanted to see who could lay the most track before they could link up.

Both companies had a hard time. Workers for the Central Pacific had to dig tunnels through the Sierra (see-ERR-uh) Nevada Mountains, a high mountain range in California. Many of these workers were Chinese immigrants who came here to do this work. Most of the workers on the Union Pacific were Irish immigrants or American blacks.

Armed with axes, picks, and shovels, all these workers leveled the land, laid track, and built bridges. In summer, the men often fainted from the terrible heat. In winter, they had to build sheds over the tracks to keep going in the snow. In all kinds of weather the work continued.

A great era of railroad building was underway. Within 50 years, 254,000 miles (about 409,000 kilometers) of railroad track crisscrossed the nation.

Evaluation

Are each of the frame slot questions answered in the text?

Questions	Answered in Text?
a. What was the Goal?	No
b. What was the Plan for attaining the Goal?	No
c. What Action was taken in response to the Plan?	Yes
d. What was the Outcome of the Action with respect to the Goal?	No

How Well are the Questions Answered in the Text?

Since only one of the questions was answered in this text, the text fails as an historical explanation. Almost all of the content has to do with the Action. The entire first paragraph is about the final event in the Action slot. The second paragraph gives a summary of the major event in the Action, starting with the final event, then the beginning event, and then the intervening events. The third and fourth paragraphs go into greater detail about the intervening events. Some of the events are cast as abbreviated problems/solutions. ("In winter, they had to build sheds over the tracks to keep going in the snow.") The fifth paragraph contains information about what happened subsequent to the building of the transcontinental railroad. These events are not necessarily directly related to the Action or to the Goal; they may more properly be classified as "Other Outcomes."

Excerpt No. 2

> Many Americans wanted a railroad that would connect the East to the West. In 1862, Congress passed a law to build the first transcontinental rail line. The Central Pacific and Union Pacific railroad companies were formed to do the work. Find these railroads on the map on page 251.
>
> The Central Pacific's line headed east from Sacramento, California. Workers laid track through the Sierra Nevada, which are high mountains. The workers built trestles and hauled dirt to make a level roadbed. They hunted for passes through the mountains. They blasted tunnels through solid rock. Once across the mountains, they worked in the heat of the deserts.
>
> The Union Pacific's line headed west from Omaha, Nebraska. Its workers faced attacks by Indians who knew that the railroads would bring millions of white people to their lands. The builders

also had trouble with herds of buffalo tearing up tracks. The Union Pacific hired hunters to kill the buffalo. Armed guards fought the Indians.

On both lines, the rail companies began running trains as soon as a section of track was laid. Now settlers could go west by train.

On May 10, 1869, the two lines met at Promontory, Utah. A golden spike was hammered to hold the last rail in place. A worker described what happened:

> When they came to drive the last spike, Governor Stanford, president of the Central Pacific, took the hammer. The first time he struck he missed the spike and hit the rail.
>
> What a howl went up! Irish, Chinese, Mexicans, and everybody yelled with delight. "He missed it. Yee." The engineers blew the whistles and rang their bells. Then Stanford tried it again and tapped the spike. The tap was reported by telegraph in all the offices east and west. It set bells to tapping in hundreds of towns and cities.

Evaluation

Are each of the frame slot questions answered in the text?

Questions	Answered in Text?
a. What was the Goal?	Sort of
b. What was the Plan for attaining the Goal?	No
c. What Action was taken in response to the Plan?	Yes
d. What was the Outcome of the Action with respect to the Goal?	No

How Well are the Questions Answered in the Text?

Again, only a few questions are answered in this text, and the text hardly qualifies as an explanation. The first sentence sounds like a goal, but what an empty goal! It does not appear to be motivated, and the young reader might be left wondering why Americans wanted a railroad that would connect the east to the west. The remainder of the text presents the Action in elaborate detail, including embedded problems/solutions about environmental barriers, Indians, and buffalo.

Excerpt No. 3

This text segment occurs after information on the Pony Express and the first transcontinental telegraph line.

> A railroad across the United States. The people now began to talk of building a railroad across the continent. Something had to be done to speed up transportation to and from the western states. The water route around South America was too long; the stagecoach was too slow; and the bad roads made a long ride very uncomfortable.
>
> Of course, building a railroad to the Pacific Coast would cost millions of dollars. None of the railroad companies had such a vast sum of money. Finally, in 1862, during the Civil War, the national government agreed to help. The Union Pacific Railroad was to start near Omaha, Nebraska, and build westward. The Central Pacific Railroad was to start at Sacramento, California, and build eastward until the two roads met.
>
> The two railroads faced great difficulties. The Central Pacific had to obtain its equipment and many building materials from the east. They had to be shipped around South America or by railroad across the Isthmus of Panama.

The workers on the railroads were usually immigrants. The crew coming from the east was largely new Irish immigrants. The crew struggling to lay the tracks over the California mountains was largely Chinese. There were as many as 10,000 Chinese laying tracks for the Central Pacific. They had begun arriving in America around 1850 and were the first Asians to come to the United States in large numbers.

By 1869 the railroads were nearing each other. On May 10, an impatient crowd gathered at Promontory, Utah. Finally, they saw one train chugging down the track from the east and another from the west.

A mighty cheer went up as the two locomotives drew near and came to a stop. Between them lay the last two rails and one last tie. A prayer was said, and then the final spikes were driven into place. One spike was of silver; it was given by Nevada. Another was of iron, silver, and gold; it came from Arizona. And the last, from California, was of gold.

As the final spike was driven, the engineers stood on the cowcatchers of their locomotives and shook hands. The East and West had been united by a transcontinental railroad! Telegraph wires carried the news to all parts of the country. Bells in every city rang out and all America rejoiced. Now California could grow faster than ever.

Evaluation

The Problem/Solution frame seems to be appropriate for this text. Are each of the frame slot questions answered in the text?

Questions	Answered in Text?
a. What was the Goal?	Yes
b. What was the Plan for attaining the Goal?	Yes
c. What Action was taken in response to the Plan?	Yes
d. What was the Outcome of the Action with respect to the Goal?	No

How Well are the Questions Answered in the Text?

This text does a much better job of answering the questions than the preceding two texts. The second sentence states a goal of speeding up transportation to and from the western states. (However, the young reader may still wonder why speedier transportation was a goal.) The third sentence tells something about the problem--the fact that existing transportation was too long, too slow, and too uncomfortable. (Since the reader had not been informed about why speedier transportation was necessary, however, it may be difficult to see why long, slow, uncomfortable transportation is a problem.) The first sentence mentions the Plan of building the transcontinental railroad. The fact that the Plan comes before the Goal may be confusing and may disrupt textual coherence. The vast majority of the text deals with the Action. The Action contains embedded problems/solutions (obtaining money to finance the railroad and obtaining equipment and building materials), as well as a torrent of detail on the final incident in Promontory, Utah. No statement of the Outcome with respect to the original goal was mentioned. The final sentence about the growth of California could probably be considered an "Other Outcome," although how it follows from the preceding text is not terribly obvious, probably particularly to a fifth grader.

Summary Comments on the Textbook Excerpts

In all three texts, the events of building the transcontinental railroad are described in exquisite detail. We suspect that the authors were trying to create interest by elaborating the colorful events of railroad construction. Unfortunately, we feel that the authors have served up

plenty of gravy but little meat. The details are there, but the main ideas are largely missing.

One can argue that we cannot blame the text for not being something it was never intended to be. Our reply is that, in our opinion, the intent should have been different. As we argued in a previous section, we think students would learn more if the building of the transcontinental railroad were explained and not simply described. An explanation would clarify the significance of events by showing how they follow logically from goals and motives. For example, we think the following text does a better job of establishing the goals and motives. This type of information would, in our opinion, improve the quality of an explanation of the building of the transcontinental railroad.

> To make a profit from their land, farmers had to send their crops to market. To work their land, they needed tools from city factories. As factories grew to supply the nation's wants, the factories consumed more and more raw materials--iron, wood, and cotton. To keep the whole process going, the vast nation, spread across a continent, needed transportation. The nation was already served by its broad rivers, its many canals, and roadways. But there had to be easier, speedier ways. (Boorstin & Kelley, 1981, p. 344)

In the next section we offer some suggestions about how authors and teachers might use Goal or Problem/Solution frames.

Writing Historical Explanations Using Frames

We believe that if authors used the Goal and Problem/Solution frames to structure their writing, explanations in social studies and history textbooks would be improved. The structure of the explanations would be clear and consistent, and the facts within each explanation would be cast

in a meaningful context. A likely outcome is that students would learn more from the text.

We anticipate two objections from authors. First, authors may feel that they are "overinferring" from facts in order to fit information into the frame. For example, because psychological goals and motives tend to be left implicit, authors may not be able to determine goals from existing source documents and thus may have to infer Goals. Our reply is that since Goals are implicit anyway, it is better to make them explicit for the reader who may not have enough knowledge or experience to infer them accurately. It may be impossible to ensure that the selected Goal or Goals are the "correct" ones, but having a goal that is consistent with the actions taken will at least help the author write a coherent explanation.

A second objection we anticipate is that we are offering a "cookbook" approach that limits creativity. Our reply is that we are suggesting a structure only; authors still have ample opportunity for creative expression within that structure.

We will illustrate the process of frame-aided writing using the Problem/Solution frame. We recommend that authors begin by constructing a frame map of the to-be-explained content in order to help them organize their ideas prior to writing. In our example, authors would sort their notes into the slots of a Problem/Solution frame map. Sorting notes into frame slot categories will reveal the depth, breadth, and detail of available information for the explanation.

Authors will then need to evaluate the adequacy of their frame mapped notes with respect to characteristics of the target audience, especially the characteristic of prior knowledge. For example, the author may discover

from examining the frame map that the Problem is inadequately conceptualized considering what the reader is likely to know about the situation. Or the author may realize that a disproportionate amount of the recorded information falls in a particular slot, such as Action. In other words, by working from a frame map in this way, authors not only have an organizational scheme for their notes but also a means of assessing the adequacy of their notes for the task at hand.

Once an adequate frame map has been constructed, authors can begin the actual writing. We have found that it is more straightforward to write from a frame map than from an outline or notecards. We offer the following suggestions for translating a particular frame map into prose. First (as confirmed by the research of Paris (1975), Bransford (as cited in Bransford, Brown, Ferrara, & Campione, in press), and Pearson, Hansen, & Gordon (1979), we believe that the content of the slots and the relationships among the slots should be made quite explicit, especially for younger readers. Second, we think it is best to match the order of presentation of events in the prose with the actual order of occurrence of the events. In other words, start with the Goal, discuss the Problem next, and then present the Solution. We have seen "successful" and interesting explanations that started with the Outcome of the Solution and then gave the Problem; however, we believe that it is usually preferable to start with the Goal and the Problem in order to establish a meaningful context for the solution. Finally, we recommend that discussion of the Outcome include an explicit statement of how the Problem was solved and how the Goal was satisfied.

Once the writing is completed, the frame map can serve as an editing aid. By comparing the map and the text, it is easy to check whether all necessary content and relationships have been included in the text.

Teaching and Learning Historical Explanations Using Frames

We believe that the Goal and Problem/Solution frames can be used instructionally in many ways. First, teachers could use frames to organize their own oral or written presentation of information to students, in much the same way we proposed that authors could use frames. Second, and we think even more important, students could be taught to use frames in learning from text. We think frames could help in learning in several ways: 1) The frame can provide students with a purpose for reading (i.e., to answer frame slot questions) and a way of predicting at least the general content of upcoming text. 2) Since the frame slots define the "main ideas" of the text, students know where to focus attention and where to apply studying techniques such as underlining or notetaking. 3) Students can use the frame slot questions as guidelines for monitoring and evaluating their own comprehension and learning. That is, students can test their own understanding, knowledge, and memory of the text by seeing whether they can answer the questions after reading the passage. 4) The frame can serve as a retrieval aid to help students remember information from the text. 5) In the case of poorly written text, students can tell whether information is missing or deficient by matching the text content with frame slots. They can then try to locate the information from other sources (by asking questions or reading other materials) or they can make inferences about the missing information. Students could also use the frame to restructure

an explanation that was structured poorly or use the information in the text to write their own "good" explanations.

A third major way in which the Goal and Problem/Solution frames could be used instructionally is in evaluating student learning. Teachers could use the frame slot questions to test students' understanding of "main ideas." The questions could be used as they stand as essay or short-answer questions, or they could be transformed into multiple-choice, true-false, or other types of test items.

Conclusion

We have been impressed with the poor quality of explanation we have seen in children's social studies and history textbooks. We have critically evaluated textbook prose in other papers (Anderson, Armbruster, & Kantor, 1980; Armbruster & Anderson, 1981; Armbruster, in press). In this report we took a more constructive approach by offering generic structures for historical explanations which we call the Goal and Problem/Solution frames. We think that information presented in these frames will be both historically and psychologically sound--in other words, good history that can be relatively easily understood and remembered. We hope that authors as well as teachers will find the Goal and Problem/Solution frames to be useful tools.

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